



PATENT

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In the Matter of the
Application of : William E. Asher et al.

Application No. : 09/219,288

Filed : December 22, 1998

Entitled : **METHOD AND APPARATUS FOR
MARKING AND IDENTIFYING
LIQUIDS**

Docket No. : 101324-54

Group Art Unit: 1743

Examiner: Lyle A. Alexander

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APPEAL BRIEF PURSUANT TO 37 C.F.R. § 1.192

Applicant hereby requests a two-month extension of time and encloses a check in the amount of \$210.00 to cover the require fee.



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I. REAL PARTY IN INTEREST

The real party of interest is the Assignee of the pending application, On-Site Analysis, Inc., of Palm Beach Gardens, Florida.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF CLAIMS

Claims 25-42 and 44-49 are currently pending in the present application, serial number 09/219,288. All rejections of all pending claims are appealed.

IV. STATUS OF AMENDMENTS

No after final amendments have been submitted.

Claims as amended in the Response filed December 24, 2003 are pending. A copy of the pending claims is included as Appendix A.

V. SUMMARY OF THE INVENTION

The present invention is directed to an apparatus for identifying marked liquids that is easy to use, inexpensive, and allows for the marking of a large number of liquids with a minimal number of silent markers.

By way of background, petroleum producers and distributors often wish to mark their petrochemical liquids for later identification. For example, chemical markers can provide a way to differentiate among various grades (e.g., regular, premium) and different types of fuel (aviation gasoline vs. automobile gasoline). Markers are also widely employed to identify proprietary or specific brands of fuel from a particular refiner. In addition, markers can identify the tax treatment of a particular fuel, and provide a useful way to monitor proper taxation and fuel distribution. (page 2, lines 5-10)

Sometimes it is preferable that the marker not be visible in the product. Markers that are not visibly discernible are termed “silent markers” and can identify a product to an authorized tester without providing any visual indication of the identity of the product to a regular or non-authorized user. (page 2, lines 28-30).

Unfortunately, few practical markers exist, and even fewer practical, silent markers exist. However, the Applicant’s invention maximizes the number of unique markers available by using marker ratios to create a large number of unique marker mixtures. The claimed apparatus is adapted for measuring these marker ratios and identifying the marked liquid. (page 3, lines 20-25).

Accordingly, in one aspect of the invention an apparatus is provided for assisting in the identification of a marked liquid. The apparatus includes a detector for detecting the plurality of markers and for generating signals indicative of the relative concentration of each of the markers, the signals defining a measured concentration ratio. In addition, the apparatus includes a data processor connected to the detector comprising a receiver to receive the signals from the detector and determine therefrom a measured concentration ratio of the markers, a look-up table storing a plurality of known concentration ratios, each concentration ratio corresponding to the signal from a specific combination of the plurality of markers at predefined relative concentrations, and a ratio comparison element capable of comparing the measured concentration ratio with known concentration ratios of identified liquids, the known ratios being accessible, via the look-up table, to the ratio comparison element, so as to permit the identification of the marked liquid. (See, for example, pending claim 25; FIG. 1; page 8, lines 2-8; and page 8, line 30 to page 9, line 11).

In another aspect of the invention, the detector is a spectroscopic detector including an absorption spectrometer, fluorescence spectrometer, a colorimeter, or a Raman spectrometer. (page 9, lines 12-16).

In yet another aspect of the invention, the apparatus further includes at least one additional detector. Preferably, the first detector is a spectroscopic detector limited to a portion of the electromagnetic spectrum associated with a select signature characteristic of a first marker

and the at least one additional detector is limited to another portion of the electromagnetic spectrum associated with a select vibrational mode signature characteristic of another of the plurality of markers. (page 8, lines 9-14).

In one embodiment, a first detector measures a nitrile vibration and a second detector measures an isotopically labeled carbon-nitrile vibration or isocyanate vibration. Preferably, the first detector measures the infrared absorption band of a nitrile vibration at 2230 cm^{-1} . The second detector preferably measures an infrared absorption band of isotopically labeled carbon-nitrile at 2140 cm^{-1} or an infrared absorption band of isocyanate at 2268 cm^{-1} . (page 9, line 28 to page 10, line 10, page 13, line 10).

In another embodiment of the present invention, a system for assisting in the identification of a marked liquid is provided. The system preferably includes a detector for detecting the plurality of markers and for generating signals indicative of the relative concentration of each of the markers, the signals defining a measured concentration ratio. (page 8, lines 3-8).

In addition, the system includes a data processor connected to the detector comprising a receiver to receive the signals from the detector and determine therefrom a measured concentration ratio of the markers, a look-up table storing a plurality of known concentration ratios, each concentration ratio corresponding to the signal from a specific combination of the plurality of markers at predefined relative concentration, and a ratio comparison element capable of comparing the measured concentration ratio with known concentration ratios of identified liquids, the known ratios being accessible, via the look-up table, by the ratio comparison element, so as to permit the identification of the marked liquid. (page 8, line 30 to page 9, line 10).

As a further component, aspect of the invention, an overall system is disclosed and claimed, including a plurality of silent markers miscible with a liquid to be identified, as well as, the detection apparatus. (page 9, line 28 to page 10, line 18).

VI. ISSUES ON APPEAL

1. Whether the Examiner has improperly rejected claims 25-42 and 44-49 pursuant to 35 U.S.C. § 102(b) in view of Clarke et al. (U.S. Patent No. 5,225,679) or Clarke (U.S. Patent No. 5,139,334).

VII. GROUPING OF CLAIMS FOR THE PURPOSES OF THIS APPEAL

Applicant believes there are two groups which stand or fall together.

In a first group, claims 25 through 35, 42, and 44 stand or fall together. Claim 25 is an independent claim directed to an apparatus for identifying marked liquids and claims 26 through 35, 42 and 44 depend from claim 25.

In a second group, claims 45 through 49 stand or fall together. Independent claim 45 requires a system for identifying a marked liquid including the positive recitation of a plurality of silent markers miscible with a liquid to be identified. Claims 46 through 49 depend from claim 45. These claims require an additional novel feature, namely the silent markers, not required by claims 25 through 42 and 44.

In a third group, dependent claims 36 through 41 represent separately patentable subject matter. In particular, this second group of claims is directed to an apparatus comprising multiple detectors. The detectors are limited to portions of the electromagnetic spectrum associated with select vibrational mode signatures characteristic of markers. Claims 36 through 41 depend from claim 25 and include the limitations of independent claim 25.

VIII. ARGUMENT

A. The Examiner's Rejections

Claims 25-42 and 44-49 stands rejected under 35 U.S.C. § 102(b) as unpatentable over U.S. Patent No. 5,139,334 to Clarke or U.S. Patent No. 5,225,679 to Clarke et al. In particular, the Examiner argues that

Exemplary of the Clarke references, Clarke et al. ('679) teach in the abstract "...an indication of the presence and quantity of the fuel component in solution. From the determined fuel component quantity and known characteristics, the fuel solution properties are predicted...". Also Clarke et al. teach in column 6 lines 14+ a look up table(23) and associated processor control unit(22) that determines the volume percent of the component of interest in the solution. Applicants state that nowhere does Clarke et al. disclose a look up table containing stored concentration ratios. This citation, from the same reference, teaches determination of a marker in a volume of fluid and compares the determination to a look up table (23) to identify the fluid. The Office maintains that the Clarke references have been properly read on the claimed invention.

Office Action mailed March 19, 2004, p. 2.

B. The Rejection of Independent Claims 25 and 45 and of dependent claim 36 is Improper

The references cited by the Examiner do not anticipate independent claims 25 and 45. A prior art rejection pursuant to 35 U.S.C. §102(b) requires that the cited reference teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present. *Manual of Patent Examining Procedure, Eighth Edition*, Chapter 706.02 § IV. The cited references, Clarke et al. and Clarke, fail to disclose several of the limitations of the independent claims. Applicant therefore respectfully requests reversal of the rejection.

1. The Clarke et al. and Clarke references fail to disclose the limitations of independent claims 25

Claim 25 pertains to an apparatus for assisting in the identification of a liquid marked with markers in a predetermined pattern of relative concentration. The apparatus requires a detector for detecting the plurality of markers and for generating signals indicative of relative concentration of each of the markers. The signals are sent to a data processor connected to the detector, the data processor includes a receiver to receive the signals from the detector and to determine therefrom a measured concentration ratio of the markers. The data processor also includes a look-up table storing a plurality of known concentration ratios, each concentration ratio corresponding to the signal from a specific combination of markers at predefined relative concentration, and a ratio comparison element capable of comparing the measured concentration ratio with known concentration ratios of identified liquids, the known ratios being accessible via the look-up table, to the comparison element, so as to permit the identification of the marked liquid.

The Clarke et al. reference fails to disclose the claimed limitations.

Clarke et al. disclose an apparatus that can determine the properties of a hydrocarbon liquid by investigating the properties of the fuel's components. For example, the apparatus can calculate fuel's octane level by measuring the volume of each fuel enhancer in the fuel and summing the fuel's basis octane rating with the contribution from each fuel enhancer. In order to determine each fuel enhancer's contribution, Clarke et al's apparatus includes a look-up table containing the octane rating of each fuel enhancer and a processor that calculates the individual contribution of each enhancer based on the octane rating of each enhancer and the volume of each enhancer.

However, Clarke et al. fail to disclose the concept of measuring the concentration *ratio of one marker to another marker*. Clarke et al. only measure the various components of a fuel that determine octane. Clarke et al. are not concerned with, or need to determine, the concentration ratios of one component to marker to another. Accordingly, Clarke et al. fail to appreciate, and

do not inherently possess, Applicant's marking scheme or the claimed apparatus, which is particularly adapted to identify a liquid using marker concentration ratios.

In particular, Clarke et al. do not disclose a (1) receiver to receive signals from the detector and *determine a measured concentration ratio* of the markers, a (2) look-up table containing a plurality of *known concentration ratios*, or a (3) *ratio comparison element* capable of comparing the measured concentration ratios with known concentration ratios. Instead, the device of Clarke et al. uses different structural elements to achieve a different result.

Clarke et al. do not have a receiver that determines the measured concentration ratios of one marker to another marker. In fact, nowhere is any sort of structure for calculating a ratio disclosed. Instead, the processor of Clarke et al. calculates the contribution of various octane enhancers. Clarke et al. do not disclose any element that combines this information to arrive at concentration ratios.

Clarke et al. also fail to disclose a look-up table containing a plurality of known concentration ratios. Instead, the look-up table of Clarke et al. only contains a list of octane ratings for each octane enhancer. Such a list of octane ratings cannot anticipate the Applicant's look-up table containing concentration ratios or provide a way to identify a marked liquid. Clarke et al. additionally fail to disclose a ratio comparison element capable of comparing measured concentration ratios with known concentration ratios. The disclosure of Clarke et al. is completely lacking any suggestion that a device could include a ratio comparison element adapted to compare concentration ratios and thus fails to anticipate the claimed limitations.

The Office Actions submitted by the Examiner suggest that prior art disclosure of detectors and processors, even though they fail to include the claimed limitations, should be enough to anticipate the claimed invention because the detectors and processors could be adapted to perform the claimed functions. Applicant respectfully disagrees. Simply because a processor is capable of being programmed to perform the claimed functions does not mean Clarke et al. can anticipate the claimed invention because it has a programmable processor. For example, the claimed look-up table requires a plurality of known concentration ratios. Simply pointing to the

look-up table of Clarke et al. is not sufficient to anticipate the claimed look-up table without some disclosure that the look-up table contains concentration ratios. Similarly, Clarke et al. fail to disclose adapting a processor to perform the function of Applicant's receiver or ratio comparison element. The prior art must teach or disclose every limitation of the claims, a requirement which cannot be met by the Clarke et al. reference.

Clarke (US 5,139,334) also fails to anticipate the claimed invention.

Clarke fails to disclose several of the requirements of independent claim 25. In particular, Clarke fails to disclose a detector for *detecting a plurality of markers* and for generating signals indicative of *relative concentrations of each of the markers*. In addition, Clarke lacks a receiver that can determine measured concentration ratios of markers, a data processor with a *look-up table containing concentration ratios* corresponding to the signal from a specific combination of a plurality of markers at predefined relative concentrations, and a ratio comparison element capable of comparing concentration ratios with known concentration ratios of identified liquids.

Clarke, like Clarke et al., is directed to methods and apparatus for measuring properties of hydrocarbons, and in particular to measuring octane ratings. However, Clarke directly measures the octane rating without extracting information about individual fuel enhancers. The disclosed system measures peak intensities and the linewidth of a least two key Raman bands in a sample of fuel. The ratio of the bands is then used to correlate to the octane rating of the fuel (col. 2, line 30 to col. 3, line 8). FIGS. 4 and 5, for example, illustrate the correlation between the band ratios and the pump octane rating.

Clarke fails to disclose the elements needed to identify a marked liquid including a detector for detecting a plurality of markers and for generating signals indicative of relative concentrations of each of the markers. The detectors of Clarke are not adapted for identifying individual components (i.e., silent markers) and Clarke therefore cannot detect a plurality of markers. In fact, Clarke states that, "the method provided by the invention is broadly based on

the Raman features of a gasoline sample and not narrowly dependent on the choice of a specific peak or band in the Raman spectrum.” Col. 5, lines 54-57.

In addition, Clarke fail to disclose a data processor with a look-up table containing concentration ratios corresponding to the signal from a specific combination of a plurality of markers at predefined relative concentrations. Instead, Clarke uses some sort of correlating or linear function to determine fuel octane rating from a ratio of one Raman band to another. The disclosure of a look-up table is completely lacking. Moreover, even if Clarke were to use a look-up table as part of the correlating procedure, the look-up table would lack concentration ratios of silent markers.

Clarke similarly lacks a ratio comparison element capable of comparing concentration ratios with known concentration ratios of identified liquids. The Clarke reference only discloses measuring the ratios of Raman bands. Nowhere does Clarke disclose comparing measured ratios with concentration ratios of identified liquids.

Accordingly, Clarke fails to anticipate the limitations of independent claim 25.

2. The Clarke et al. and Clarke references fail to disclose the limitations of independent claims 45.

With respect to independent claim 45, Clarke et al. and Clarke also fail to disclose the required claim limitations. In particular, independent claim 45 requires a receiver to receive measured concentration ratios, a look-up table containing a plurality of known concentration ratios, and a ratio comparison element capable of comparing the measured concentration ratios with known concentration ratios. In addition, independent claim 45 positively recites *a plurality of silent markers* miscible with a liquid to be identified; a limitation not found in the cited prior art.

As discussed above, Clarke et al. disclose a system that investigates fuel properties such as octane by summing the contribution of fuel enhancers. Nowhere does Clarke et al. disclose silent markers, and the fuel enhancers are not the equivalent of *silent markers*.

Silent markers are added to a fuel as a means of identifying the fuel's properties, tax treatment, origin, or other such property. The fuel enhancers of Clarke et al. are not markers because they are regular components of fuel and thus do not provide a distinguishing tag. If the fuel enhancers were added to fuel as a marking agent, the concentration of the marker could not be determined because it would be unclear what quantity is a regular fuel component and what quantity is the marking portion. Moreover, adding fuel enhancers changes the properties of a fuel and would defeat the purpose of marking a fuel to indicate its characteristics.

Accordingly, in addition to the failure to disclose a receiver to receive measured concentration ratios, a look-up table containing a plurality of known concentration ratios, and a ratio comparison element capable of comparing the measured concentration ratios with known concentration ratios, Clarke et al. fails to disclose silent markers. Claim 45 is therefore novel over the cited reference.

Clarke (US 5,139,334) similarly fails to disclose silent markers. Clarke instead measures gasoline properties of fuel without any disclosure of markers and completely fails to appreciate the concept of silently marking fuel. In addition, as discussed above, Clarke fails to disclose a receiver to receive measured concentration ratios, a look-up table containing a plurality of known concentration ratios, and a ratio comparison element capable of comparing the measured concentration ratios with known concentration ratios. Accordingly, Clarke can not anticipate claim 45.

For these reasons, Appellant submits that it is proper to reverse this rejection.

C. The Clarke et al. and Clarke references fail to disclose the limitations of dependent claims 36 to 41.

With respect to dependent claims 36 to 41, Clark et al. and Clarke fail to disclose two or more detectors each limited to a portion of the electromagnetic spectrum associated with a select vibrational mode signature characteristic of a marker. The markers used by Applicant's device to identify a liquid have unique spectroscopic signatures, and Applicant's multiple detectors can

focus on the portion of the electromagnetic spectrum associated with the markers. Conversely, Clarke et al. and Clarke disclose detectors focused on fuel enhancers or Raman bands.

Clarke et al. and Clarke therefore fail to anticipate the claimed features found in claims 36 through 41 in addition to those required by independent claim 25. According, Applicant requests reversal of this rejection.

D. Clarke et al. and/or Clarke would fail to provide support for an obviousness type rejection.

In anticipation of a possible obviousness type rejection, Applicant would like to note that such a rejection would similarly fail. Clarke et al. and Clarke are directed to measuring octane ratings and are particularly adapted to that purpose. Nowhere does either references, separately or in combination, suggest the unique marking system for which the Applicant's apparatus is adapted. Thus, one of ordinary skill in the art would have no motivation to modify the apparatus disclosed in Clarke et al. and Clarke to meet the limitations of the Applicant's claims.

Clarke et al. and Clarke completely fail to appreciate the concept of the measuring the ratio of one concentration to another concentration as a unique way to expand the number of liquids that can be identified with a limited number of available markers. In the prior art, if the existence of two markers was used to identify a liquid there would only be four possibilities, marker 1, marker 2, marker 1 and 2 or neither marker one or two. Prior to the present invention, unique identification required large numbers of unique markers. Applicants have discovered that a multitude of liquids can be marked with unique signatures by testing for the relative concentrations of a small set of markers.

The apparatus of the present invention requires a look-up table storing these known concentration ratios, each concentration ratio corresponding to the signal from a specific combination of the plurality of markers at a predefined relative concentration. Conversely, the look-up table disclosed in Clarke et al. contains information on the octane rating of individual fuel enhancers, while Clarke fails to disclose any look-up table. One of ordinary skill in the art

would have no reason to modify the octane rating testing apparatus of Clarke et al. and Clarke to include such a look-up table filled with the concentration ratios of markers.

In addition, one of ordinary skill in the art would have no reason to modify Clarke et al. and Clarke to include a receiver to receive measured concentration ratios and a ratio comparison element capable of comparing the measured concentration ratios with known concentration ratios. These elements are particularly adapted to measuring concentration ratios, a concept unappreciated by the prior art.

Applicant therefore believes the pending claims are novel and nonobvious in view of the prior art and respectfully request reversal of the outstanding rejections.

IX. CONCLUSION

For the reasons noted above, Appellant submits that all pending claims define patentable subject matter. Accordingly, Appellant respectfully requests that the rejection of these claims be reversed and that the pending application be passed to issue.

Dated: September 24, 2004

Respectfully submitted,



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APPENDIX A

CLAIMS ON APPEAL:

1. – 24. Canceled

25. An apparatus for assisting in the identification of a marked liquid, the liquid comprising a plurality of markers miscible with the liquid and present in a predetermined pattern of relative concentrations, the apparatus comprising:

a detector for detecting the plurality of markers and for generating signals indicative of relative concentrations of each of the markers, the signals defining a measured concentration ratio; and

a data processor connected to the detector comprising:

a receiver to receive the signals from the detector and determine therefrom a measured concentration ratio of the markers;

a look-up table storing a plurality of known concentration ratios, each concentration ratio corresponding to the signal from a specific combination of the plurality of markers at predefined relative concentrations; and

a ratio comparison element capable of comparing the measured concentration ratio with known concentration ratios of identified liquids, the known ratios being accessible, via the look-up table, to the ratio comparison element, so as to permit the identification of the marked liquid.

26. The apparatus of claim 25, wherein said detector is a spectroscopic detector.

27. The apparatus of claim 26, wherein said spectroscopic detector is an absorption spectrometer.

28. The apparatus of claim 27, wherein said absorption spectrometer is a near infrared spectrometer.

29. The apparatus of claim 27, wherein said absorption spectrometer is a mid-infrared spectrometer.

30. The apparatus of claim 27, wherein said absorption spectrometer operates in the visible spectrum.
31. The apparatus of claim 26, wherein said spectroscopic detector is a fluorescence spectrometer.
32. The apparatus of claim 31, wherein said fluorescence spectrometer is a near infrared spectrometer.
33. The apparatus of claim 26, wherein said spectroscopic detector is a colorimeter.
34. The apparatus of claim 26, wherein said spectroscopic detector is a Raman spectrometer.
35. The apparatus of claim 25, wherein said detector is limited to those portions of the electromagnetic spectrum associated with select vibrational mode signatures characteristic of said plurality of markers.
36. The apparatus of claim 25, further comprising at least one additional detector, wherein the detector is limited to that portion of the electromagnetic spectrum associated with a select vibrational mode signature characteristic of a first marker and wherein the at least one additional detector is limited to that portion of the electromagnetic spectrum associated with a select vibrational mode signature characteristic of another of the plurality of markers.
37. The apparatus of claim 36, wherein the detector measures a nitrile vibration and the at least one additional detector measures an isotopically labeled carbon-nitrile vibration.
38. The apparatus of claim 36, wherein the detector measures infrared absorption band of a nitrile vibration at 2230 cm^{-1} and the at least one additional detector measures an isotopically labeled carbon-nitrile infrared absorption band at 2140^{-1} cm .
39. The apparatus of claim 36, wherein the detector measures a nitrile vibration and the at least one additional detector measures an isocyanate vibration.

40. The apparatus of claim 36, wherein the detector measures infrared absorption band of a nitrile vibration at 2230 cm^{-1} and the at least one additional detector measures an isocyanate infrared absorption band at 2268 cm^{-1} .
41. The apparatus of claim 36, wherein the detector measures absorbance at a wavelength of 520 nm and the at least one additional detector measures absorbance at a wavelength of 550 nm.
42. The apparatus of claim 25, wherein said comparison element is a dedicated microprocessor.
43. Canceled
44. The apparatus of claim 36, wherein said comparison element is a dedicated microprocessor.
45. A system for assisting in the identification of a marked liquid, comprising;
a plurality of silent markers miscible with a liquid to be identified; and
a detector for detecting the plurality of silent markers and for generating signals indicative of relative concentrations of each of the silent markers; and
a data processor connected to the detector comprising:
a receiver to receive the signals from the detector and determine therefrom a measured concentration ratio of the markers;
a look-up table storing a plurality of known concentration ratios, each concentration ratio corresponding to the signal from a specific combination of the plurality of silent markers at predefined relative concentrations; and
a ratio comparison element capable of comparing the measured concentration ratio with known concentration ratios of identified liquids, the known ratios being accessible, via the look-up table, to the ratio comparison element, so as to permit the identification of the marked liquid

46. The system of claim 45, wherein said detector is limited to those portions of the electromagnetic spectrum associated with select vibrational mode signatures characteristic of said plurality of markers.

47. The system of claim 45, further comprising at least one additional detector, wherein the detector is limited to that portion of the electromagnetic spectrum associated with a select vibrational mode signature characteristic of a first marker and wherein the at least one additional detector is limited to that portion of the electromagnetic spectrum associated with a select vibrational mode signature characteristic of another of the plurality of markers.

48. The system of claim 47, wherein the detector measures infrared absorption band of a nitrile vibration at 2230 cm^{-1} and the at least one additional detector measures an isocyanate infrared absorption band at 2268 cm^{-1} .

49. The system of claim 47, wherein the detector measures absorbance at a wavelength of 520 nm and the at least one additional detector measures absorbance at a wavelength of 550 nm.

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